

Mima Capital LLC
4120 Douglas Blvd, #306-175
Granite Bay, California, 95746

Project No. E22116.000
29 March 2022

Subject: **CALLISON ROAD (7615)**
7615 Callison Road, Penryn, California
SLOPE STABILITY STUDY FOR SEPTIC LEACH FIELD

Attention: Mr. Evan Mackenzie

References:

1. Septic Evaluation Report for 7615 Callison Road, prepared by Lindbloom Septic Design, Inc., dated 27 January 2022
2. Leach Field Area Plan, prepared by Marc Lindbloom
3. Executed Proposal and Contract for Callison Road (7615), prepared by Youngdahl Consulting Group, Inc., dated 28 February 2022

Dear Mr. Mackenzie:

In accordance with your authorization, Youngdahl Consulting Group, Inc. has prepared this slope stability study for the project site located at 7615 Callison Road in Penryn, California. The purpose of this study was to prepare a site-specific slope stability report that evaluates if the future installation of an on-site septic system with a leach field on this slope adversely affects the slope stability. To complete this evaluation, our firm completed a subsurface exploration engineering analysis in preparation for this report in accordance with the Reference 3 contract. The vicinity map provided on Figure A-1, Appendix A shows the approximate project location.

Project Understanding

The proposed leach field will be located on a slope that exceeds 30 percent. According to the Placer County Department of Environmental Health, such a septic system requires a slope stability study prior to approval.

If studies or plans pertaining to the site exist and are not cited as a reference in this report, we should be afforded the opportunity to review and modify our conclusions and recommendations as necessary.

Purpose and Scope

Youngdahl Consulting Group, Inc. has prepared this report to address geotechnical engineering considerations related to the installation of the septic leach field on the site. The following scope of services were developed and performed for preparation of this report:

- A review of geotechnical and geologic data available to us at the time of our study;
- Performance of a field study consisting of a site reconnaissance and subsurface explorations to observe and characterize the subsurface conditions;
- Laboratory testing on representative samples collected during our field study;
- Evaluation of the data and slope stability assessment based on information obtained from our field study and, laboratory testing;
- Preparation of this report summarizing our findings and conclusions regarding the above-described information.



Surface Observations

The project site is located at 7615 Callison Road in Penryn. The project is bounded by a railroad to the north, a proposed parking lot to the south and undeveloped land to the east west. Topography at the site slopes down towards the north at varying gradients with a maximum gradient of approximately 3H:1V (Horizontal:Vertical). At the time of our visit on 2 March 2022, the vegetation at the site consisted of grasses and mature trees. No indications of slope instability were noted across the proposed leach field area.

Subsurface Conditions

Our field study included a site reconnaissance by a representative of our firm and a subsurface exploration program. The exploration program included the excavation of 3 test pits to evaluate the near surface soils conditions and the depth to rock. The approximate locations of the test pits are presented on Figure A-2, Appendix A.

The subsurface soil conditions at the site appeared to consist of a thin layer of native soils overlying rock. The soils generally consisted of silty sand soils overlying shallow weathered granitic bedrock. The soil profile, in-situ density and moistures measured in our test pits is presented in Figures A-3 through A-5, Appendix A.

Laboratory Testing

Laboratory testing of the collected samples was directed towards determining the physical and engineering properties of the soil and bedrock underlying the site. A description of the test performed for this project and the associated test results are presented in Appendix B. The parameters used in our slope stability analysis are presented in Table 2. In summary, the following test was performed for the preparation of this report:

Table 1: Laboratory Testing

Laboratory Test	Test Standard	Summary of Results	
Direct Shear	ASTM D3080	TP @ 1.5-2'	$\Phi = 39.9^\circ$, $c = 0$ psf (Remolded to field measured density and moisture content)

Table 2: Soil and Rock Values

Material	Description	Friction Angle (Deg)	Cohesion (psf)	Unit Weight (pcf)
Soil	Native Soil	39.9	0	105.6
KJpd (Penryn Pluton)	Completely weathered quartz diorite	43	0	150

Modeling Methods and Results of the Analyses

Slope stability modeling was performed using Slide2 software developed by RocScience. For the purpose of our evaluation, we elected to evaluate the slope using the Spencer and Generalized Limit Equilibrium/Mortensen-Price (GLE) methods as these are computer generated methods to satisfy vertical force, horizontal force, and moments in the calculation process. The results for these two methods were relatively similar and the results have been included as an attachment in this report. Additionally, the slope condition was evaluated under both static and seismic loadings.



In assessing the slope conditions for stability, we did not consider cohesion in the calculations to evaluate the existing soil and rock conditions to obtain a worst-case scenario factor of safety (FS). Using the parameters in the Soil and Rock Values table above, and with the Spencer and GLE methods, the analyses produced FS values of 1.582 and 1.581, respectively for a static loading. The analyses produced FS values of 1.211 and 1.211, respectively for a seismic loading.

Conclusions and Recommendations

The proposed septic leach field area was observed to be moderately sloping to the southwest at an approximate gradient of 3H:1V with a dense covering of grasses and trees. Based on the modelled slope stability scenario generated from the parameters above and modified soil parameters that provided a conservative FS value, a minimum FS value of 1.5 was obtained. Our analysis revealed that the slope would remain stable under saturated condition with the soil and rock conditions observed in the test pits for proposed leach field area. Please do not hesitate to contact us should you have any questions regarding our slope stability assessment.

Very truly yours,
Youngdahl Consulting Group, Inc.

Reviewed By:


Pavel Fomin
Staff Engineer


Martha A. McDonnell, P.E.
Associate Engineer



Distribution: PDF to Client
Attachments: Figures
Slope Stability Analysis Results

4-8-22

APPENDIX A

Field Study

Vicinity Map

Site Plan

Logs of Exploratory Test Pits

Soil Classification Chart and Log Explanation



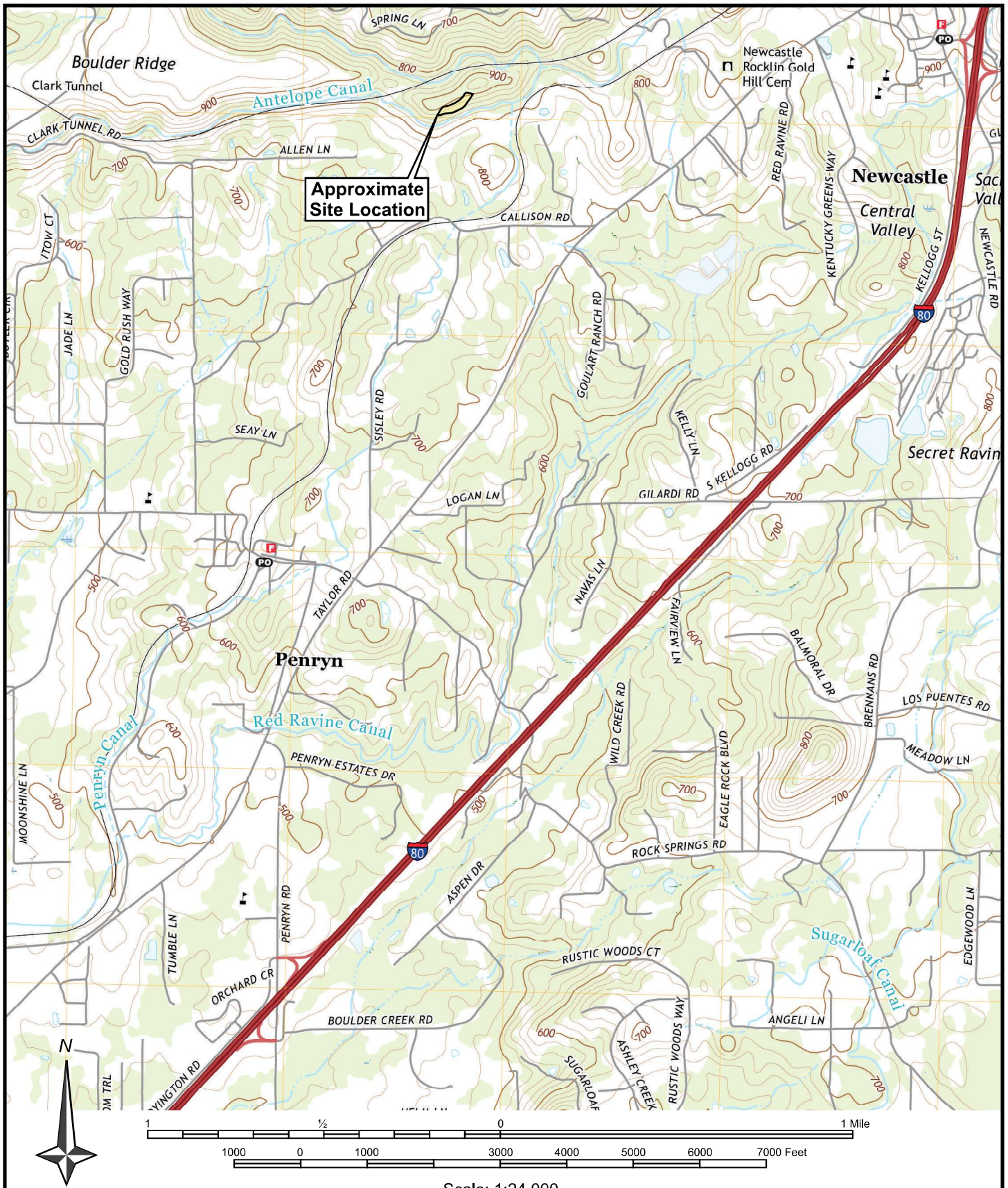
Introduction

The contents of this appendix shall be integrated with the Slope Stability Study of which it is a part of. They shall not be used in whole or in part as a sole source for information or recommendations regarding the subject site.

Our field study included a site reconnaissance by a Youngdahl Consulting Group, Inc. representative followed by a subsurface exploration program conducted on 2 March 2022, which included the excavation of 3 test pits under his direction at the approximate locations shown on Figure A-2, this Appendix. Excavation of the test pits was accomplished with a Caterpillar 315 excavator equipped with a 24-inch-wide bucket. The bulk and bag samples collected from the test pits were returned to our laboratory for further examination and testing.

The Exploratory Test Pit Logs describe the vertical sequence of soils and materials encountered in each test pit, based primarily on our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradual, our logs indicate the average contact depth. Our logs also graphically indicate the sample type, sample number, and approximate depth of each soil sample obtained from the test pits.

The soils encountered were logged during excavation and provide the basis for the "Logs of Test Pits", Figures A-3 through A-5, this Appendix. These logs show a graphic representation of the





REFERENCE: Google Earth, Aerial Data Dated 6/3/2021

FIGURE
A-2

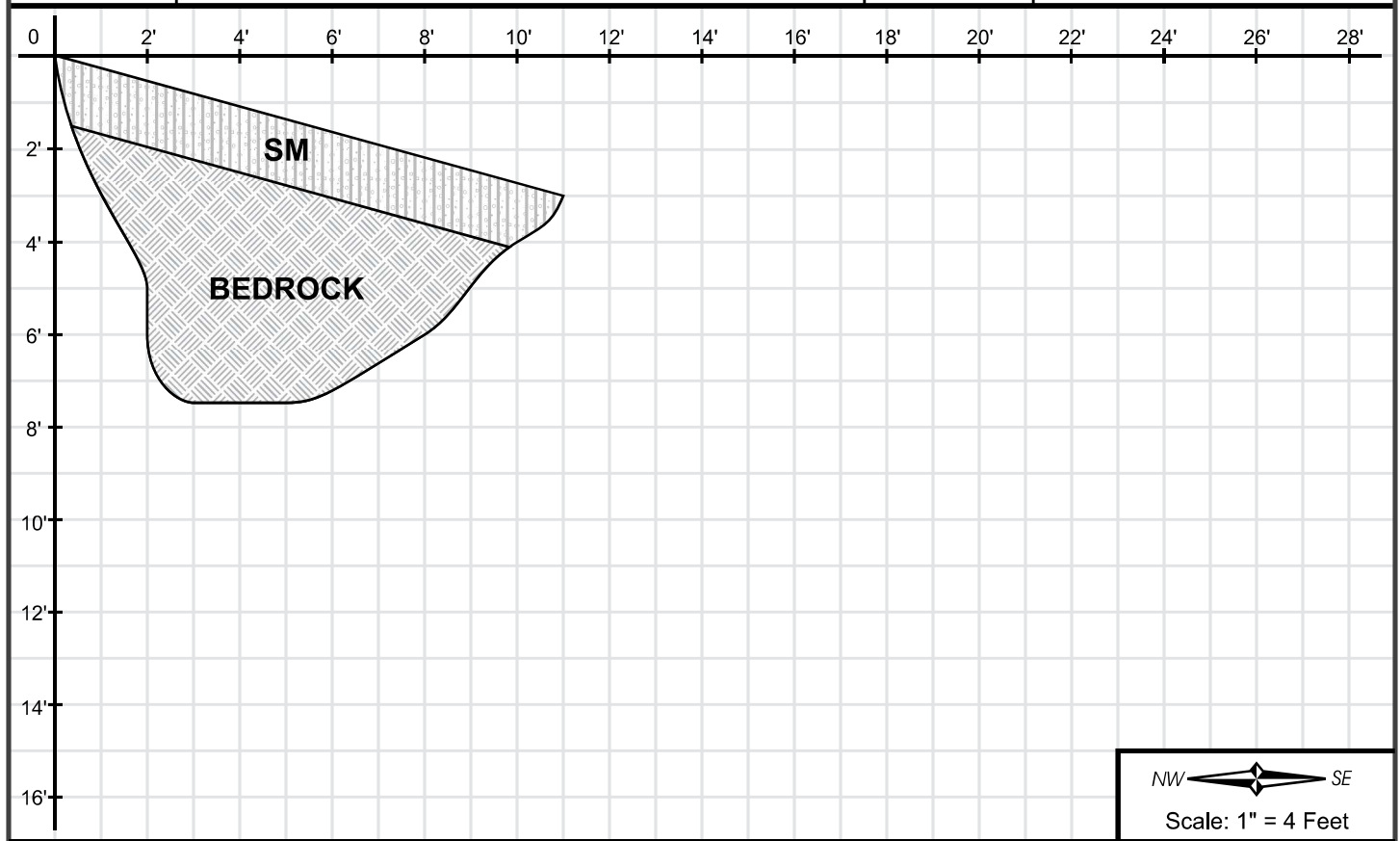
SITE PLAN
Callison Road (7615)
Penryn, California

Project No.:
E22116.000
March 2022



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TP-1 = Approximate Test Pit Locations



Note: The test pit log indicates subsurface conditions only at the specific location and time noted. Subsurface conditions, including groundwater levels, at other locations of the subject site may differ significantly from conditions which, in the opinion of Youngdahl Consulting Group, Inc., exist at the sampling locations. Note, too, that the passage of time may affect conditions at the sampling locations.



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EXPLORATORY TEST PIT LOG

Callison Road (7615)
Penryn, California

FIGURE

A-3

Logged By: PF		Date: 2 March 2022		Lat / Lon: N 38.871617° / W 121.159644°		Pit No. TP-2	
Equipment: CAT 315 with 24" Bucket				Pit Orientation: 335°		Elevation: ~	

Depth (Feet)	Geotechnical Description & Unified Soil Classification	Sample	Tests & Comments
@ 0' - 2'	Brown to yellow brown silty SAND (SM) , medium to dense, slightly moist to moist		DD: 105.3 pcf M: 10.4%
@ 2' - 2.5'	Red yellow to olive yellow sandy CLAY (CL) , stiff, moist		DD: 98.9 pcf M: 24.7%
@ 2.5' - 4'	Red yellow BEDROCK , highly weathered, moderately hard, slightly moist		DD: 107.4 pcf M: 12.4%
@ 4' - 8'	<i>Grades red yellow to pink, dry</i>		
	Test pit terminated at 8' No free groundwater encountered No caving noted		

Note: The test pit log indicates subsurface conditions only at the specific location and time noted. Subsurface conditions, including groundwater levels, at other locations of the subject site may differ significantly from conditions which, in the opinion of Youngdahl Consulting Group, Inc., exist at the sampling locations. Note, too, that the passage of time may affect conditions at the sampling locations.

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March 2022

EXPLORATORY TEST PIT LOG


Callison Road (7615)
Penryn, California

FIGURE
A-4
















Logged By: PF		Date: 2 March 2022		Lat / Lon: N 38.87110° / W 121.159958°		Pit No. TP-3	
Equipment: CAT 315 with 24" Bucket				Pit Orientation: 350°		Elevation: ~	

Depth (Feet)	Geotechnical Description & Unified Soil Classification	Sample	Tests & Comments
@ 0' - 2'	Olive brown silty SAND (SM) , medium dense, dry to slightly moist		DD: 108.3 pcf M: 12.3%
@ 2' - 5.5'	Red brown to yellow brown BEDROCK , highly weathered, moderately soft, slightly moist		DD: 103.5 pcf M: 14.8%
@ 5.5' - 9'	<i>Grades grey, moderately hard</i>		DD: 115.4 pcf M: 16.7%
	Test pit terminated at 9' No free groundwater encountered No caving noted		

Note: The test pit log indicates subsurface conditions only at the specific location and time noted. Subsurface conditions, including groundwater levels, at other locations of the subject site may differ significantly from conditions which, in the opinion of Youngdahl Consulting Group, Inc., exist at the sampling locations. Note, too, that the passage of time may affect conditions at the sampling locations.

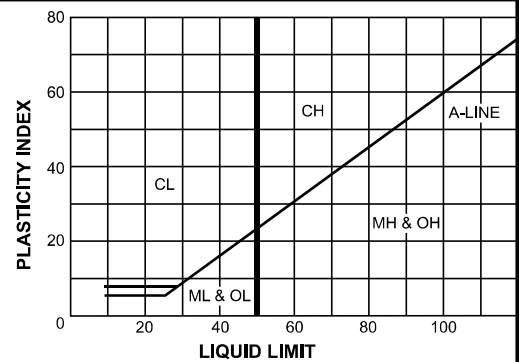
 YOUNGDAHL CONSULTING GROUP, INC. <small>ESTABLISHED 1984</small>	Project No.: E22116.000	EXPLORATORY TEST PIT LOG Callison Road (7615) Penryn, California	FIGURE A-5
	March 2022		

UNIFIED SOIL CLASSIFICATION SYSTEMS

MAJOR DIVISION			SYMBOLS		TYPICAL NAMES	
COARSE GRAINED SOILS Over 50% > #200 sieve	GRAVELS Over 50% > #4 sieve	Clean GRAVELS With Little Or No Fines	GW		Well graded GRAVELS, GRAVEL-SAND mixtures	
			GP		Poorly graded GRAVELS, GRAVEL-SAND mixtures	
		GRAVELS With Over 12% Fines	GM		Silty GRAVELS, poorly graded GRAVEL-SAND-SILT mixtures	
			GC		Clayey GRAVELS, poorly graded GRAVEL-SAND-CLAY mixtures	
	SANDS Over 50% < #4 sieve	Clean SANDS With Little Or No Fines	SW		Well graded SANDS, gravelly SANDS	
			SP		Poorly graded SANDS, gravelly SANDS	
		SANDS With Over 12% Fines	SM		Silty SANDS, poorly graded SAND-SILT mixtures	
			SC		Clayey SANDS, poorly graded SAND-CLAY mixtures	
FINE GRAINED SOILS Over 50% < #200 sieve	SILTS & CLAYS Liquid Limit < 50	ML		Inorganic SILTS, silty or clayey fine SANDS, or clayey SILTS with plasticity		
		CL		Inorganic CLAYS of low to medium plasticity, gravelly, sandy, or silty CLAYS, lean CLAYS		
		OL		Organic CLAYS and organic silty CLAYS of low plasticity		
	SILTS & CLAYS Liquid Limit > 50	MH		Inorganic SILTS, micaceous or diamaceous fine sandy or silty soils, elastic SILTS		
		CH		Inorganic CLAYS of high plasticity, fat CLAYS		
		OH		Organic CLAYS of medium to high plasticity, organic SILTS		
HIGHLY ORGANIC CLAYS		PT		PEAT & other highly organic soils		

PLASTICITY CHART

USED FOR CLASSIFICATION OF FINE GRAINED SOILS



SAMPLE DRIVING RECORD

BLOWS PER FOOT	DESCRIPTION
25	25 Blows drove sampler 12 inches, after initial 6 inches of seating
50/7"	50 Blows drove sampler 7 inches, after initial 6 inches of seating
50/3"	50 Blows drove sampler 3 inches during or after initial 6 inches of seating

Note: To avoid damage to sampling tools, driving is limited to 50 blows per 6 inches during or after seating interval.

SOIL GRAIN SIZE

U.S. STANDARD SIEVE	6"	3"	¾"	4	10	40	200		
SOIL GRAIN SIZE IN MILLIMETERS	BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
			COARSE	FINE	COARSE	MEDIUM	FINE		
	150	75	19	4.75	2.0	.425	0.075	0.002	

KEY TO PIT & BORING SYMBOLS

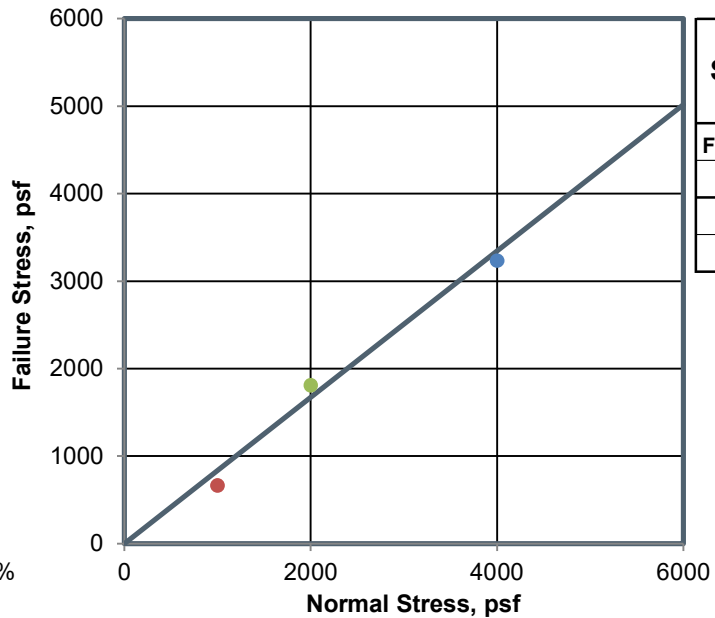
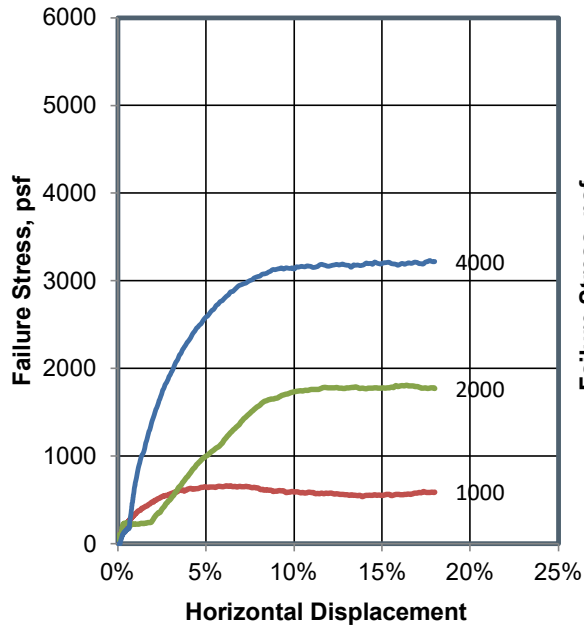
	Standard Penetration test
	2.5" O.D. Modified California Sampler
	3" O.D. Modified California Sampler
	Shelby Tube Sampler
	2.5" Hand Driven Liner
	Bulk Sample
	Water Level At Time Of Drilling
	Water Level After Time Of Drilling
	Perched Water

KEY TO PIT & BORING SYMBOLS

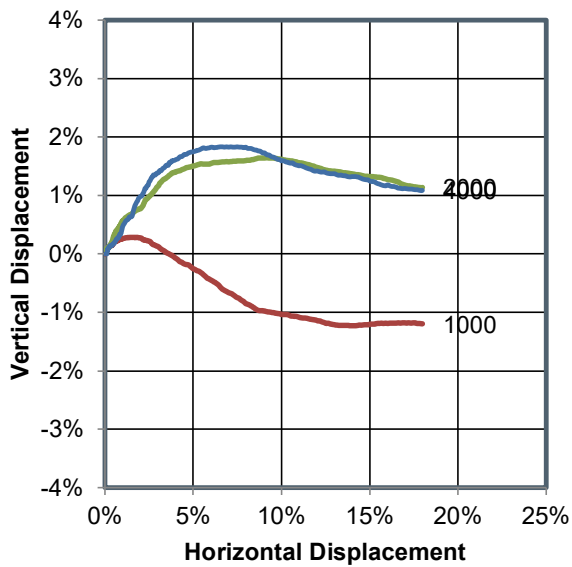
	Joint
	Foliation
	Water Seepage
NFWE	No Free Water Encountered
FWE	Free Water Encountered
REF	Sampling Refusal
DD	Dry Density (pcf)
MC	Moisture Content (%)
LL	Liquid Limit
PI	Plasticity Index
PP	Pocket Penetrometer
UCC	Unconfined Compression (ASTM D2166)
TVS	Pocket Torvane Shear
EI	Expansion Index (ASTM D4829)
Su	Undrained Shear Strength

APPENDIX B
Laboratory Testing
Direct Shear Test

Direct Shear Test of Soils Under Consolidated Drained Conditions, ASTM D3080



Direct Shearbox Results	
Friction Angle	39.9°
Cohesion	0 psf



Test No.		1	2	3
Initial	Wet Density, pcf	118.4	118.4	118.4
	Dry Density, pcf	105.6	105.6	105.6
	Moisture Content, %	12.1	12.1	12.1
	Diameter, in	2.50	2.50	2.50
	Height, in	1.00	1.00	1.00
Pre Shear	Wet Density, pcf	128.9	137.7	139.4
	Dry Density, pcf	111.3	119.0	121.2
	Moisture Content, %*	15.8	15.8	15.0
	Diameter, in	2.50	2.50	2.50
	Height, in	0.95	0.89	0.87
Normal Stress, psf		1000	2000	4000
Failure Stress, psf		663	1809	3231
Failure Strain, %		6.17	16.38	17.70
Rate, in/min		0.002		

*Based on post shear moisture content

Sample Type: Specified Remold

Material Description: Brown Clayey SAND with Gravel

Source:

Notes: Gravel removed from test sample.

Sample No./Depth:	USCS Class.	Liquid Limit	Plasticity Index	% Greater than No. 4	% Less than No. 200
TP-1 @ 1.5-2'				8	
Date Sampled: 3/3/2022	Date Test Started: 3/17/2022				



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Project: Callison Road

Project No.: E22116.00

Reviewed By: DN Date: 3/21/2022

Figure
B-1

APPENDIX C

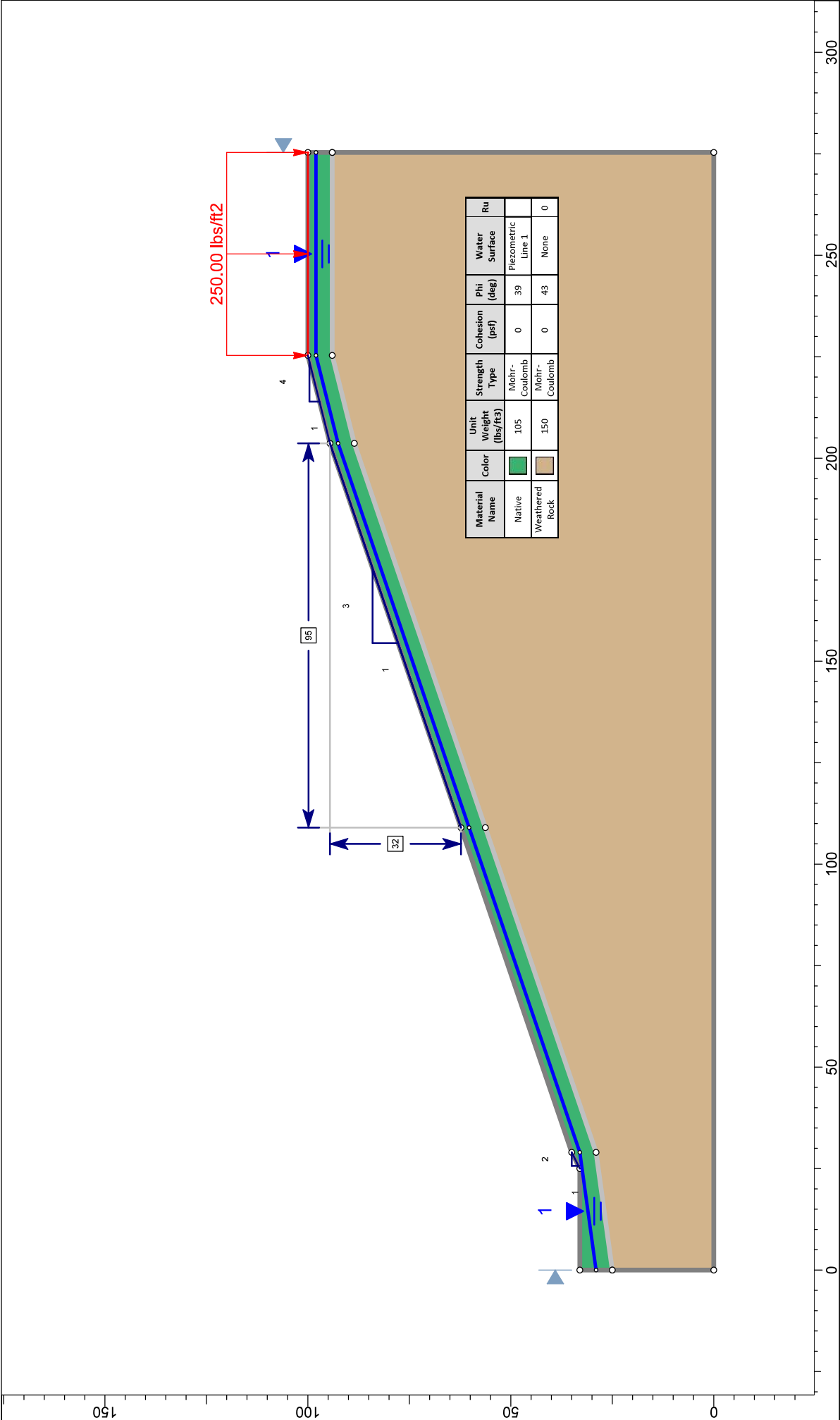
Slope Stability Analysis

Static Conditions

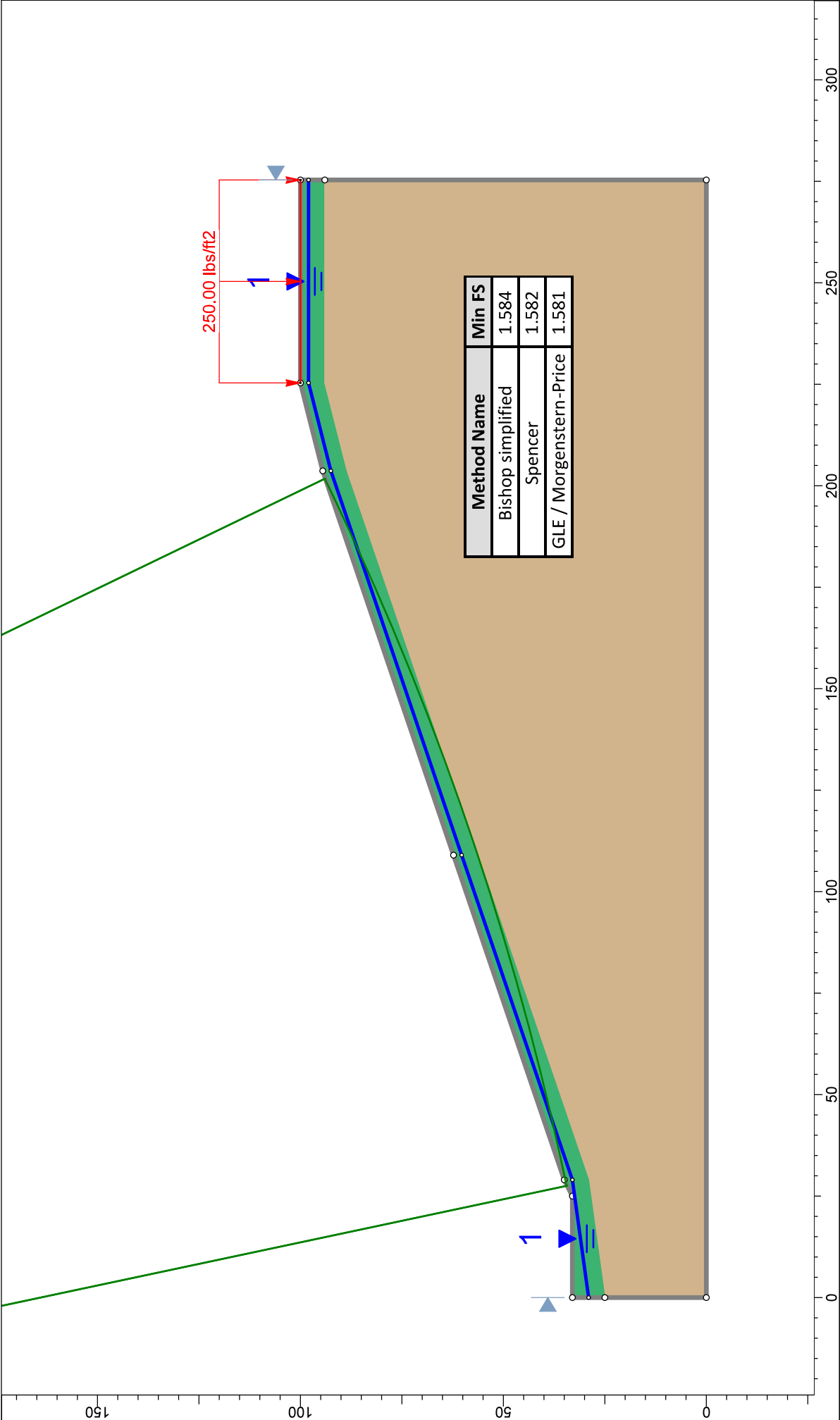
Static Analysis

Seismic Conditions

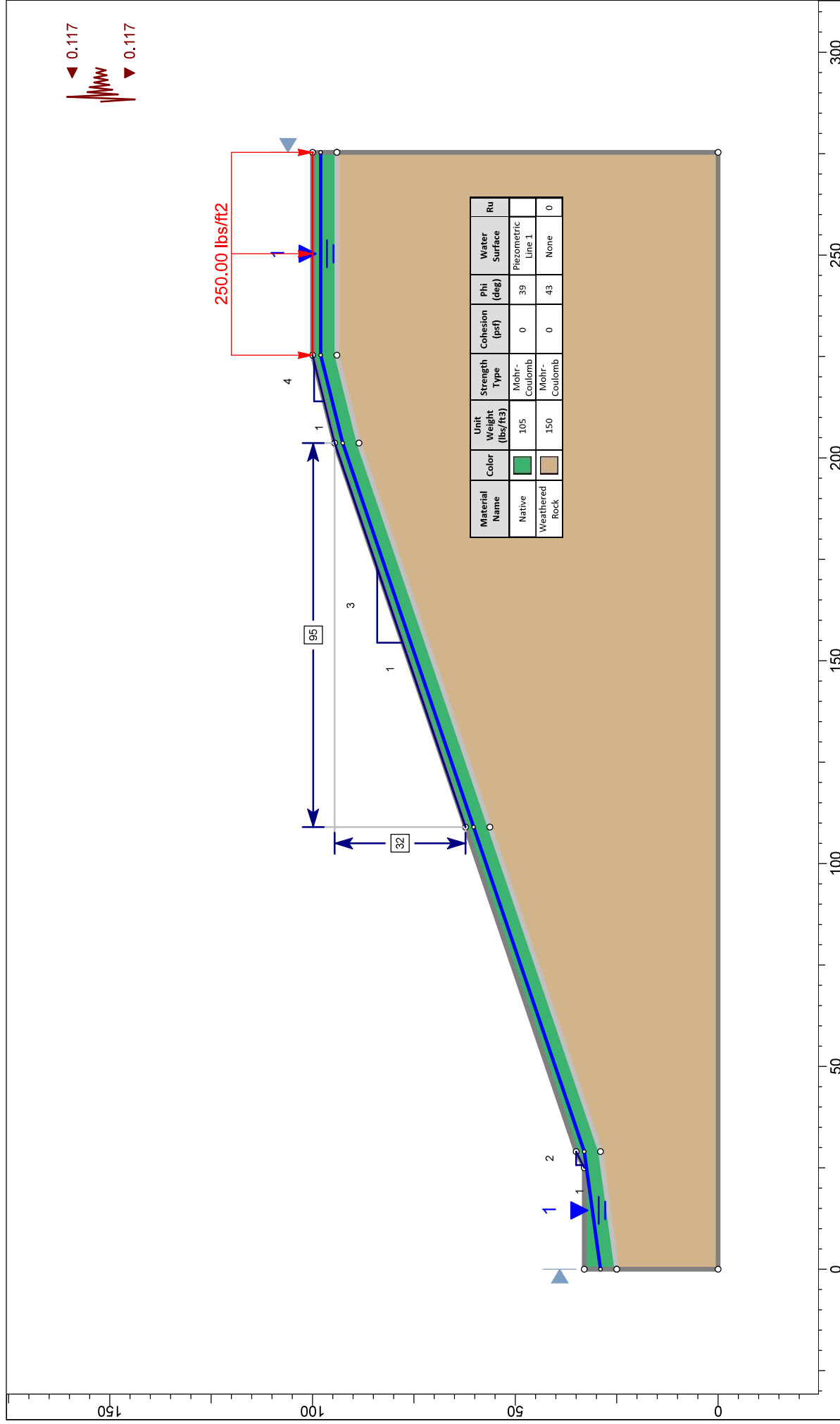
Seismic Analysis

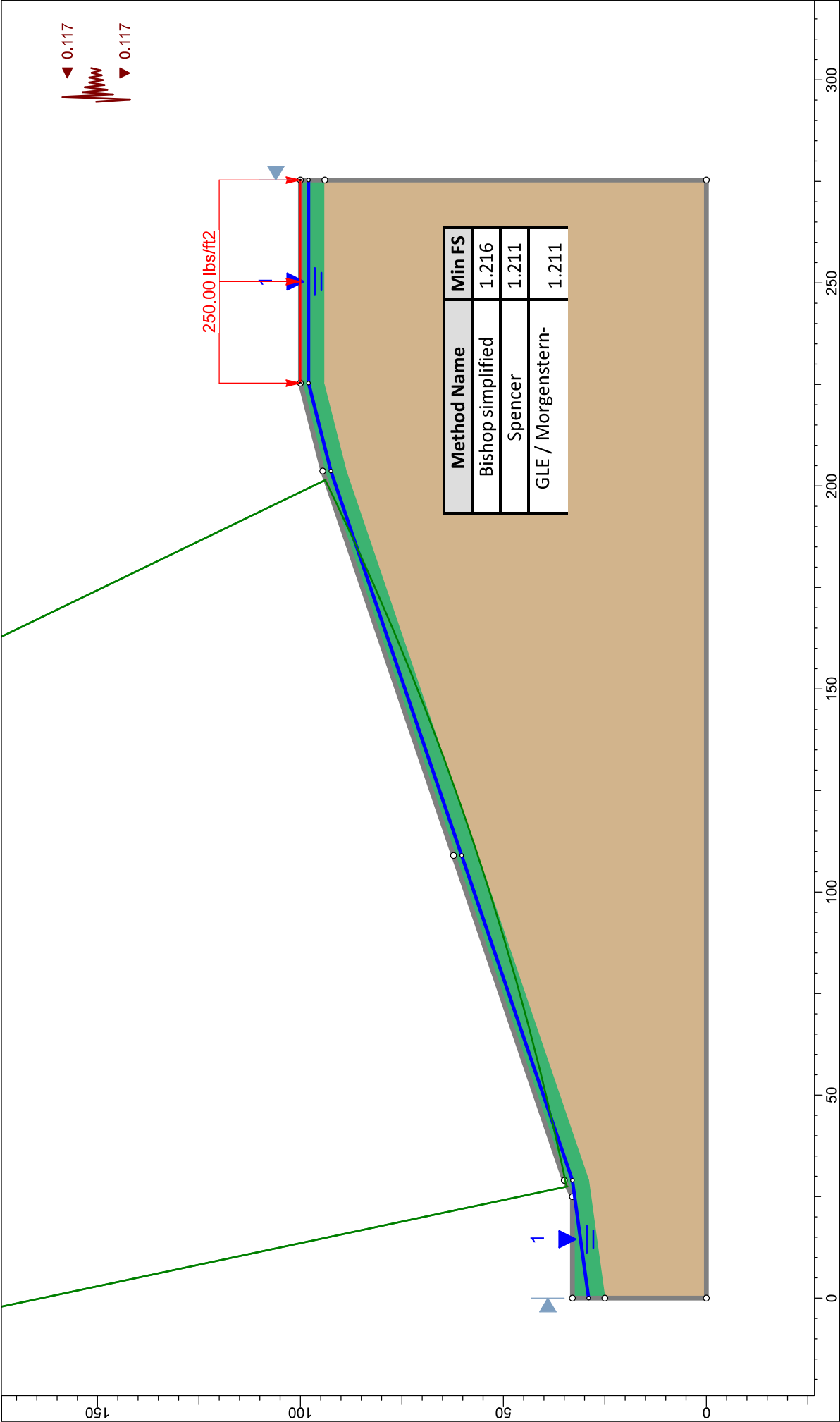


Project		E22116.000 Callison Road (7615) Slope Stability	
Analysis Description		Leach Field Area	
Scenario Group		Leach Field Area	Static
Analysis Method		Scale	1:400
File Name		E22116.000 Leach Field Slope Stability.slmnd	



Project		E22116.000 Callison Road (7615) Slope Stability	
Analysis Description		Leach Field Area	
Scenario Group	Leach Field Area	Scenario	Static
Analysis Method	Bishop simplified	Scale	1:400
File Name	E22116.000 Leach Field Slope Stability.slm		





Project		E22116.000 Callison Road (7615) Slope Stability	
Analysis Description		Leach Field Area	
Scenario Group		Leach Field Area	Seismic
Analysis Method		Spencer	1:400
File Name		E22116.000 Leach Field Slope Stability.slmd	